

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Inventors:	Eidson, John C., et al.	Examiner:	Phan, Thanh S.
Serial No.:	10/026,059	Group Art Unit:	2833
Filing Date:	December 18, 2001	Confirmation No:	8596
Title:	REDUCING THERMAL DRIFT IN ELECTRONIC COMPONENTS		

Commissioner for Patents
P.O. Box 1450
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BRIEF ON APPEAL

Sir:

This Brief on Appeal is in furtherance of Applicant's Notice of Appeal filed August 18, 2008 appealing the final rejection, dated May 16, 2008, of Claims 1, 3, 4, 6, 12-15, 17, 18, 20, and 28-32.

A copy of the Claims appears in the Appendix to this Appeal Brief.

REAL PARTY IN INTEREST (37 C.F.R. §41.37(c)(1)(i))

Pursuant to 37 C.F.R. §41.37(c)(1)(i), the real party in interest in this appeal is: Agilent Technologies, Inc.

RELATED APPEALS AND INTERFERENCES (37 C.F.R. §41.37(c)(1)(ii))

Pursuant to 37 C.F.R. §41.37(c)(1)(ii), there are no appeals or interferences that will directly affect, or be directly affected by, or have bearing on, the Board's decision in the pending appeal.

STATUS OF CLAIMS (37 C.F.R. §41.37(c)(1)(iii))

Pursuant to 37 C.F.R. §41.37(c)(1)(iii), the status of the claims is as follows:

A. TOTAL NUMBER OF CLAIMS IN THE APPLICATION

Claims in the Application are 1-32.

B. STATUS OF ALL CLAIMS IN APPLICATION

1. Claims cancelled: 2, 5, 7-11, 16, 19, and 21-27.
2. Claims withdrawn from consideration but not cancelled: NONE
3. Claims pending: 1, 3, 4, 6, 12-15, 17, 18, 20, and 28-32.
4. Claims allowed: NONE
5. Claims rejected 1, 3, 4, 6, 12-15, 17, 18, 20, and 28-32

C. CLAIMS ON APPEAL

The Claims on Appeal are: 1, 3, 4, 6, 12-15, 17, 18, 20, and 28-32.

STATUS OF AMENDMENTS

Pursuant to 37 C.F.R. §41.37(c)(1)(iv), the status of amendments is as follows:

No Amendments are pending.

SUMMARY OF CLAIMED SUBJECT MATTER

Pursuant to 37 C.F.R. §41.37(c)(1)(v), the invention is directed to the subject matter recited, for instance, in the following independent claims, with embedded citations to supporting information disclosed in the specification and in the drawings.

1. (Previously presented) A circuit, comprising:

a circuit board (FIGs. 2-6: 12);

an electronic component (FIG. 2-6: 10) mounted on the circuit board (FIGs. 2-6: 12); and

a heat-conducting structure (FIG. 2:14, FIG. 3: 16, and/or FIG. 4: 20 and 22) immediately adjacent to the electronic component (FIG. 2-6: 10) and increasing a thermal mass (page 6, lines 15-21) of the electronic component (FIG. 2-6: 10) so as to reduce a thermal drift (page 6, lines 13-15) of the electronic component (FIG. 2-6: 10),

wherein the electronic component (FIG. 1-6: 10 and FIG. 7:70) controls a frequency (page 1, lines 15-17 and 30-33) of a signal used by the circuit.

15. (Previously presented) A distributed system (FIG. 7: 110) (page 8, lines 20-22) having a set of nodes (FIG. 7: 90 and 92) (page 8, lines 22-24), each node comprising:

a local clock (FIG. 7:80) including a crystal component (FIG. 7:70) page 8, lines 24-26);

a heat-conducting structure (page 10, lines 4-13, referring back to page 6, lines 13-21 et seq.) immediately adjacent to the crystal component and increasing a thermal mass of the crystal component so as to reduce a thermal drift of the crystal component.

28. (Previously presented) A circuit, comprising:

a circuit board (FIG. 2: 12);

a crystal component (FIG. 7:70) mounted on the circuit board (page 1, lines 11-17); and

means for increasing (page 10, lines 4-13, referring back to page 6, lines 13-21 et seq.) a thermal mass of the crystal component (FIG. 7:70) so as to reduce a thermal drift of the crystal component.

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Pursuant to 37 C.F.R. §41.37(c)(1)(vi), the grounds of rejection to be reviewed on appeal are as follows:

Claims 1, 3, 6, 12, 13 and 27 under 35 U.S.C. § 103 over Mathews et al. U.S. Patent 6,686,649 ("Mathews") in view of Luce et al. U.S. Patent 4,008,564 ("Luce");

Claims 4 and 30 under 35 U.S.C. § 103 over Mathews in view of Luce and further in view of Mullins, U.S. Patent 4,736,069 ("Mullins");

Claims 14, 15, 17 and 20 under 35 U.S.C. § 103 over Mathews in view of Luce and further in view of Kirkpatrick U.S. Patent Publication 2002/0186618 ("Kirkpatrick");

Claim 18 under 35 U.S.C. § 103 Mathews as modified and applied to claim 15, and further in view of Mullins; and

Claim 32 under 35 U.S.C. § 103 over Mathews in view of Luce and further in view of Hobbs U.S. Patent 4,659,236 ("Hobbs").

ARGUMENT (37 C.F.R. §41.37(c)(1)(vii))

Pursuant to 37 C.F.R. §41.37(c)(1)(vii), Applicants, by and through their undersigned Attorney, make the following arguments with respect to the above-cited grounds for rejection:

I. RELEVANT LAW

As stated in MPEP § 2143, in order to establish a *prima facie* case of obviousness, three basic criteria under 35 U.S.C. § 103 must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Against this background the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. While the sequence of these questions might be reordered in any particular case, the factors continue to define the inquiry that controls.

If a court, or patent examiner, conducts this analysis and concludes the claimed subject matter was obvious, the claim is invalid or unpatentable under § 103. *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727; 82 U.S.P.Q.2D 1385 (2007), citing, in part *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966).

However, the Court in *KSR* continued: "A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning. See *Graham*, 383 U.S., at 36, 86 S. Ct. 684, 15 L. Ed. 2d 545 (warning against a "temptation to read into the prior art the teachings of the invention in issue" and instructing courts to "guard against slipping into the use of hindsight" (quoting *Monroe Auto Equipment Co. v. Heckethorn Mfg. & Supply Co.*, 332 F.2d 406, 412 (CA6 1964)))."

The Court in *KSR* further explained that when the prior art teaches away from a combination, that combination is more likely to be nonobvious. Notably, the Court relied on the Federal Circuit's statement, in *In re Gurley*, as follows:

"A reference may be said to teach away when a person of ordinary skill, upon reading the reference, *would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant* . . . [or] *if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant.*" *In re Gurley* 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994).

(Emphasis added.)

- II. THE CITED REFERENCES MAY NOT PROPERLY BE COMBINED TO ATTEMPT TO MAKE A PRIMA FACIE SHOWING OF OBVIOUSNESS, BECAUSE THE REFERENCES DO NOT SUGGEST OR MOTIVATE THEIR COMBINATION. RATHER, THE PRIOR ART CITED IN SUPPORT OF THE REJECTION ACTUALLY TEACHES AWAY FROM THE CLAIMED INVENTION

A. ANALYSIS OF THE MATHEWS PRIMARY REFERENCE

The primary reference, Mathews, is relied on for an alleged teaching, stated in the comments in support of the rejection as follows:

Regarding claim 1, Mathews et al. disclose a circuit board [I 02, figure 4], comprising an electronic component [I04] mounted on the circuit board; a heat conducting structure [I52; column 6, lines 7-11] immediately adjacent to the electronic component and increasing a thermal mass of the electronic component so as to reduce a thermal drift of the electronic component.

In the rejection, column 6, lines 7-11 of Mathews are cited in support of the proposition that Mathews teaches the element of

a heat-conducting structure immediately adjacent to the electronic component and increasing a thermal mass of the electronic component so as to reduce a thermal drift of the electronic component

as recited in claim 1, and recited similarly in independent claims 15 and 28.

Applicants respectfully traverse this reading of the cited language from Mathews. That language actually states something quite different:

Referring now to FIGS. 1, 2, and 3 together, shield 152 is formed of an electrically conductive material. Illustratively, shield 152 is formed of a stamped, formed, or deposited metal such as stainless-steel, copper or tin alloy. In this embodiment, shield 152 is in the shape of a hollow rectangular box having its bottom missing. Stated another way, shield 152 is a rectangular lid.

The cited language does not say that the shield 152 is a "heat-conducting structure," merely that it is "electrically conductive." This, in and of itself, is sufficient to demonstrate that the cited language does not teach the claimed invention.

Note that Mathews goes on to teach at column 9, lines 54-67, that the actual purposes of the shield 152 are (i) to "prevent electronic components... from receiving unwanted radiation" (lines 56-58), and (ii) to "[prevent] electronic components... from emanating unwanted radiation..." (lines 59-61) Thus, it will be seen that the shield 152 has nothing to do with conducting heat; rather, it is an electromagnetic shield.

It might be argued that the shield 152 could still conduct heat because it is made of stainless-steel, copper, or tin, as per the above quoted language. However, note also that the shield 152 is "formed of a stamped, formed or deposited metal..." A person of ordinary skill in the art would not form a "heat-conducting structure" by deposition. Deposition is used for producing thin layers, for their electrical conductivity. Notwithstanding the rejection, in reality Mathews teaches that the shield 152 is a structural element which, while well-suited for its actual purpose as an electromagnetic shield, may be too thin for "heat conducting."

Referring back to the points of law cited above, it will be seen that a teaching of the shield 152 as, possibly, being "deposited" so as to form a (presumably) thin, electrically conductive electromagnetic shield, but which may be completely unsuitable for effective "heat conducting", is a teaching away from the claimed invention. Therefore, as per the Supreme Court in *KSR*, citing the Federal Circuit in *In re Gurley*, the present rejection of the claimed subject matter based on Mathews is not a proper rejection under section 103.

Nevertheless, even if, *arguendo*, we were to grant this strained reading of the shield 152 of Mathews as to a "heat-conducting structure," nowhere is there any teaching that the shield 152 "[increases] a thermal mass" of Mathews' electrical component 104. Nowhere is there any

teaching that the shield 152 "[reduces] a thermal drift" of that component. Neither of these claimed aspects are taught, mentioned, suggested, or inferred.

The rejection has made no effort to point out any such teaching in Mathews. Rather, the rejection seems to assume that any structural element which is arguably (even if incorrectly) construed as being heat conductive, necessarily also has the properties of "increasing a thermal mass of the electronic component so as to reduce a thermal drift of the electronic component". Mathews teaches or suggests no such thing. Therefore, the claimed subject matter may not properly be rejected as obvious over Mathews.

As noted above, the independent claims 15 and 28 recite aspects of the invention similarly to those quoted from claim 1. Therefore, all three of the independent claims, and their dependent progeny, are patentably distinct over Mathews, taken alone.

B. ANALYSIS OF THE SECONDARY REFERENCES

The secondary references cited in support of rejections of respective subsets of the claims also do not teach or suggest the above-discussed aspects of the claimed invention.

In the comments in support of the rejection, it is stipulated that "Luce was use for the teaching of the functionality of an electronic component and not the heatsink/emi shielding structure." Applicants' attorney submits that this statement is a stipulation that the above-discussed claim elements, not taught or suggested by Mathews, also are not taught or suggested by Luce.

Mullins is relied on for a teaching of a ceramic structure to minimize vibration degradation. This also is unrelated to the claimed thermal properties of the claimed invention, and Mullins gives no teaching or suggestion of thermal properties of that ceramic structure.

Kirkpatrick is relied on for a teaching of clock synchronization, but again does not teach or suggest a structure with thermal properties as recited in the claimed invention.

Finally, Hobbs is relied on for a teaching of a Styrofoam thermal insulator, which certainly does not have the thermal properties of the claimed invention, nor are there other elements disclosed elsewhere in Hobbs which teach or suggest the claimed invention.

It will therefore be seen that a person of ordinary skill in the art would have found no teaching or suggestion of the claimed invention from the cited references, taken singly or in combination. None of the cited secondary references teach or suggest the claimed aspects of

the present invention that are missing from Mathews. It is respectfully submitted that the claimed invention is patentably distinct over the prior art references, taken separately or in any cited combination.

III. APPLYING THE CITED REFERENCES TO SUPPORT A PRIMA FACIE SHOWING OF OBVIOUSNESS OF THE CLAIMED INVENTION IS AN ACT OF IMPERMISSIBLE HINDSIGHT

Applicants respectfully submit that impermissible hindsight has been used in an attempt to construe the applied art in a way that a person of ordinary skill in the art would not have done without knowledge of the claimed invention.

As noted above, the rejection is based on a reading of the Mathews primary reference, which characterizes the "shield 152" as the claimed "heat conducting structure" for "increasing a thermal mass of the electronic component so as to reduce a thermal drift of the electronic component."

By contrast, Mathews actually teaches that the shield 152 is "formed of an electrically conductive material", such as "a stamped, formed, or deposited metal", and gives no teaching or suggestion that the shield 152 increases a thermal mass of the component, or reduces the component's thermal drift.

Persons skilled in the art would have known that electrical conductivity and thermal conductivity are two separate and distinct properties of materials such as metals. They would have known, also, that two fundamentally different kinds of structures are used in circuits and circuit board structures for these two different purposes. In particular, thermal conductivity requires size and weight much greater than that of structures whose only purpose is electrical conductivity. In particular, as noted above, deposition is not a technique used to create such thermally conductive structures.

Respectfully, Applicants assert that a person skilled in the art would never construe the prior art as the Examiner suggests, if the artisan did not already know about Applicants' disclosure and claims, to use as templates for their reconstruction. Thus, the rejection is hindsight, which is based on a "[reading] into the prior art the teachings of the invention in issue" as per *KSR*, above.

Therefore, but for the use of Applicants' claims as a template for their own reconstruction, the proffered combination of references could not be made. As such, the rejection relies on impermissible hindsight, and is wholly improper.

IV. RESPONSE TO ARGUMENTS FOR REJECTION IN THE ADVISORY ACTION

The Advisory Action reiterated the allegation that the claimed subject matter is taught by the prior art but adds no additional arguments for rejection. Accordingly, Applicants' attorney submits that the Advisory Action requires no response or refutation, beyond that given above.

CONCLUSION AND PRAYER FOR RELIEF

For at least the reasons set forth above, Applicants respectfully submit that the rejection of claims 1, 3, 4, 6, 12-15, 17, 18, 20, and 28-32 under 35 U.S.C. § 103 is improper, and that claims 1, 3, 4, 6, 12-15, 17, 18, 20, and 28-32 are patentable over the applied art.

It is respectfully requested that the Board of Patent Appeals and Interferences reverse the Examiner's final rejection of Claims 1, 3, 4, 6, 12-15, 17, 18, 20, and 28-32 so that this case may be allowed and pass to issue in a timely manner.

Respectfully submitted,

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CLAIMS APPENDIX (37 C.F.R. §41.37(c)(1)(viii))

1. (Previously presented) A circuit, comprising:
a circuit board;
an electronic component mounted on the circuit board; and
a heat-conducting structure immediately adjacent to the electronic component and increasing a thermal mass of the electronic component so as to reduce a thermal drift of the electronic component,
wherein the electronic component controls a frequency of a signal used by the circuit.
2. (Cancelled)
3. (Previously presented) The circuit of claim 1, wherein the structure comprises a metal case around the electronic component.
4. (Previously presented) The circuit of claim 1, wherein the structure comprises a ceramic case around the electronic component.
5. (Cancelled)
6. (Previously presented) The circuit of claim 1, further comprising a thermal insulator that encases the structure.
- 7-11. (Cancelled)
12. (Original) The circuit of claim 1, wherein the circuit is an oscillator circuit.
13. (Original) The circuit of claim 1, wherein the circuit is a clock circuit.
14. (Previously Presented) The circuit of claim 13, further comprising:
means for communication via a network;
means for synchronizing a local time value in the clock circuit in response to a set of messages transferred via the network.

15. (Previously presented) A distributed system having a set of nodes, each node comprising:
a local clock including a crystal component;
a heat-conducting structure immediately adjacent to the crystal component and increasing a thermal mass of the crystal component so as to reduce a thermal drift of the crystal component.

16. (Cancelled)

17. (Previously presented) The distributed system of claim 15, wherein the structure comprises a metal case around the crystal component.

18. (Previously presented) The distributed system of claim 15, wherein the structure comprises a ceramic case around the crystal component.

19. (Cancelled)

20. (Previously presented) The distributed system of claim 15, further comprising a thermal insulator that encases the structure.

21-27. (Canceled)

28. (Previously presented) A circuit, comprising:
a circuit board;
a crystal component mounted on the circuit board; and
means for increasing a thermal mass of the crystal component so as to reduce a thermal drift of the crystal component.

29. (Previously presented) The circuit of claim 28, wherein the means for increasing a thermal mass of the crystal component comprises a metal case adjacent to the crystal component.

30. (Previously presented) The circuit of claim 28, wherein the means for increasing a thermal mass of the crystal component comprises a ceramic case adjacent to the crystal component.

31. (Previously presented) The circuit of claim 28, further comprising a thermal insulator that encases the means for increasing the thermal mass of the crystal component.

32. (Previously presented) The circuit of claim 31, wherein the thermal insulator is styrofoam.

EVIDENCE APPENDIX (37 C.F.R. §41.37(c)(1)(ix))

None.

RELATED PROCEEDINGS APPENDIX (37 C.F.R. §41.37(c)(1)(x))

None.